Draft

Environmental Impact Report & Statement

San Francisco Wastewater Master Plan February 1974

Summary
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City and County of San Francisco
U.S. Environmental Protection Agency

DRAFT

ENVIRONMENTAL IMPACT REPORT AND STATEMENT
(D-EPA-24003-CA)

SAN FRANCISCO WASTEWATER MASTER PLAN
FEBRUARY 1974

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Pacific Southwest, Region IX
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Upon completion of the Master Plan, wastes will receive secondary treatment at the Southeast and Richmond-Sunset plants. Effluent from these plants will be transmitted through a tunnel and pipeline system to the southwest corner of the City and discharged approximately four miles offshore. During storm conditions, flows exceeding the capacity of the secondary treatment plants will be transported to the 1,000 mgd capacity Southwest Treatment Plant where it will receive Level I (low dose ferric chloride) treatment and be discharged about two miles offshore.

Implementation Plan I, North Point Transport Project, is scheduled for construction in 1974. The North Point Transport Project will convey untreated wastewater from the existing North Point Water Pollution Control Plant to the Southeast Water Pollution Control Plant which will allow conversion of the North Point plant to a wet weather treatment facility.

3. Summary of Environmental Impacts:

   A. Construction impacts will occur in almost every area of the City--land use changes, traffic disruption, noise, dust, flora and fauna disruption, aesthetics, utility disruption, and temporary turbidity increases in the Bay and Ocean waters.

   B. Interim discharge of combined North Point and Southeast secondary treated effluent into South San Francisco Bay.

   C. Elimination of the North Point primary discharge to San Francisco Bay.

   D. Control of wet weather flows along the northeast shoreline at completion of Stage I resulting in only five wet weather overflows per year.

   E. Control of wet weather flows City-wide at completion of the Master Plan resulting in only eight wet weather overflows per year.

   F. Master Plan provides secondary treatment of all dry weather flow and discharge to the Pacific Ocean through a five-mile outfall.

G. Capacity of the treatment facilities will not allow for population growth beyond that compatible with the applicable air implementation plan prepared pursuant to the Clean Air Act Amendments of 1970. Secondary impacts in this area are expected to be minor.

4. Alternatives:

A. No Project

B. Many Individual Treatment Plants

C. Expansion of Three Existing Plants

D. One Regional Plant Without Wet Weather Storage

E. Sewer Separation

F. Reclamation

5. Dates Available to CEQ and the Public:

Draft: March 13, 1974

Final:

6. Distribution List Attached

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PREFACE

The Draft Environmental Impact Report and Statement (EIR&S) was prepared jointly by the City and County of San Francisco and the U. S. Environmental Protection Agency (EPA) on the City's Master Plan for Wastewater Management.

The Draft EIR&S is in two volumes. The first evaluates the overall environmental effects of the Master Plan for Wastewater Management while the second evaluates the specific environmental effects of Implementation Plan I, North Point Transport Project, scheduled for construction in 1974. This transport project is part of the Master Plan's Stage I facilities.

The Draft EIR&S has been prepared to fulfill the mandate of both State and Federal legislation which requires that consideration of environmental aspects be built into the decision making process. This legislation includes the California Environmental Quality Act (CEQA) of 1970 and the National Environmental Policy Act (NEPA) of 1969.

EPA is considering assisting the City and County of San Francisco in constructing the North Point Transport Project. A final decision on this action will not be made, however, until after public review of the Draft EIR&S as required by CEQA and NEPA.

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SUMMARY

THE PROBLEM

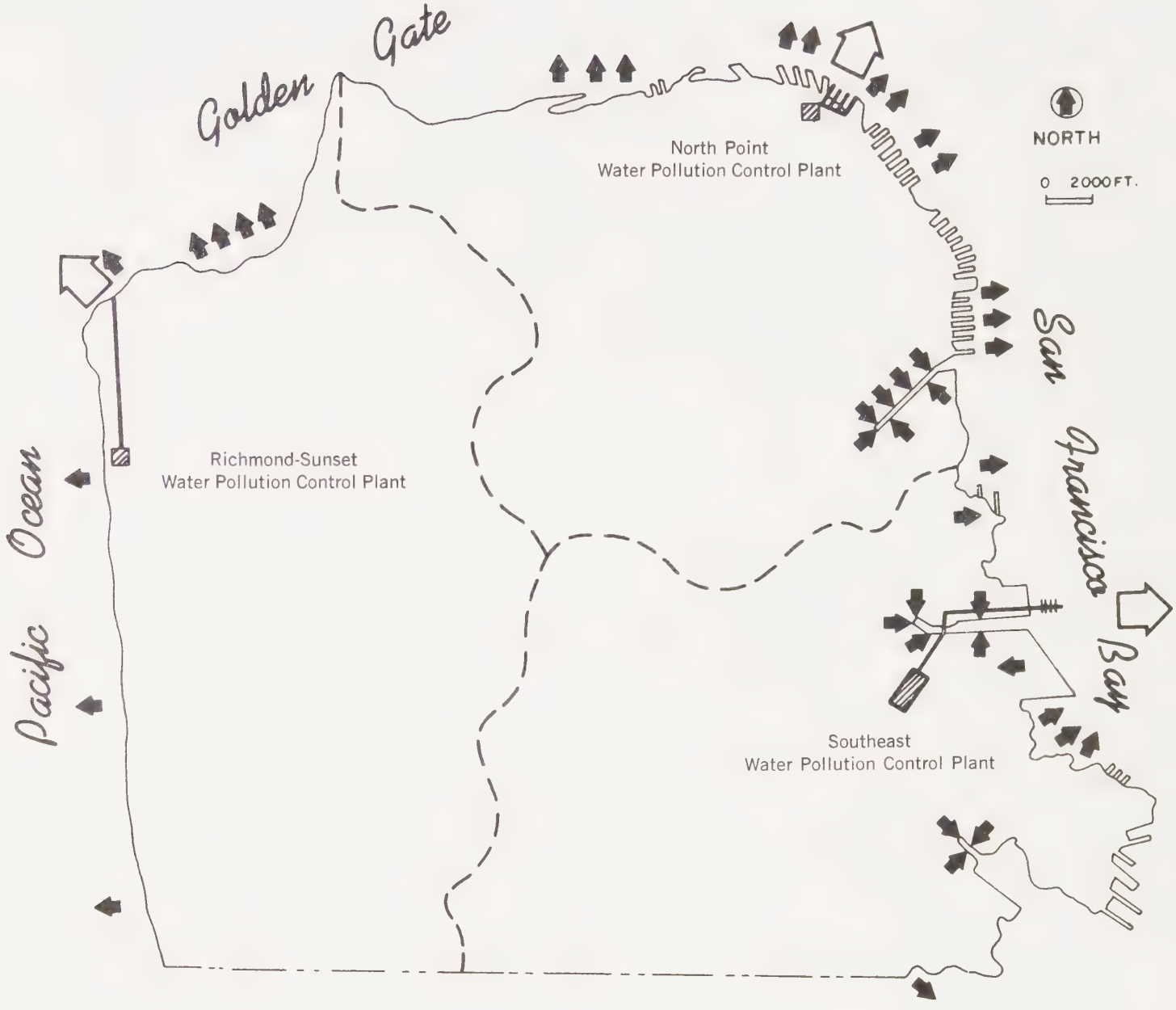
The people, businesses, and industries in the City and County of San Francisco generate more than 100 million gallons of wastewater each day--an average of about 140 gallons per day for each resident in the City. The City has improved its facilities to convey and treat this wastewater before it is discharged into San Francisco Bay and the Pacific Ocean. However, increasing environmental knowledge and standards, combined with recent State and Federal regulations and enforcement actions, require a vastly accelerated improvement program.

In meeting these needs, San Francisco must cope with a special situation. The municipal and industrial wastewaters together with stormwater runoff are transported in a combined wastewater collection system, most of which was constructed in the early 1900's. This type of system, which is common in older communities throughout the United States, creates special problems in the conveyance and treatment of wastewaters. For instance, the City's average dry weather wastewater flow of 100 million gallons per day (mgd) increases to as much as 14 billion gallons per day during storm periods.

Municipal and industrial wastewaters must be treated to lessen health hazards and damage to aquatic environments. Stormwaters, although they may contain large concentrations of grease, oil, lead, bacteria, and other pollutants, are not normally treated prior to discharge. However, the discharge of untreated combined wastewaters is a definite health hazard and is aesthetically unacceptable. Therefore, the combined wastewaters of San Francisco must be treated prior to discharge to the aquatic environment.

Presently, during dry periods all wastewater is collected and treated at three separate treatment facilities--Richmond-Sunset, North Point, and Southeast. However, during most rainy periods the 340 mgd combined hydraulic capacity of these three plants is exceeded, resulting in untreated wastewater being discharged from the collection system at 41 overflow structures located around the periphery of the City as shown on Figure 1.

FIGURE I
EXISTING FACILITIES



The existing three treatment plants (North Point, Southeast, and Richmond-Sunset) provide primary treatment with chemical addition and discharge through the outfalls shown on the map. Located around the perimeter of the City are solid arrows representing the existing 41 bypass locations. At these points a combination of untreated domestic wastewater and stormwater overflows into the Bay and Ocean when rainfall exceeds 0.02 inches per hour. Overflows occur approximately 80 times per year.

The three plants provide advanced primary treatment. In each case, the effluent quality and treatment efficiency is superior to conventional primary treatment[1] but not adequate to meet the present State requirements or the provisions of the 1972 Amendments to the Federal Water Pollution Control Act (PL 92-500). Compliance with those regulations can only be achieved by major capital expenditures for new secondary treatment facilities.

During rainstorms, despite the high flow rates, the treatment plants do remove approximately 60 percent of pollutants. However, large quantities of bacteria, grease, and untreated human waste are discharged along the shoreline, particularly in the beach areas, as a result of some of the average 82 overflows per year. Although these overflows occur only about 2.4 percent of the time in an average year, water quality and beach conditions are affected for days after each overflow. Generally, these overflows leave waste material on the beaches throughout the winter months.

ALTERNATIVE SOLUTIONS

There are a variety of ways in which the City can correct its wastewater problems. Some of the more obvious solutions are:

- The construction of separate stormwater and sanitary sewer systems. Separation of sewers would cost over $3 billion and result in major disruption throughout the City for many years. If separation were achieved, some treatment or special disposal practices might still be necessary for the stormwaters due to the highly urban characteristics of the City which result in pollutants in the stormwaters.

- The construction of improved treatment facilities at the existing plant locations plus separate treatment facilities for wastewaters bypassed at the existing 41 overflow points or at some consolidation of those sites. This alternative would also cost an estimated $3 billion and its effectiveness and reliability are questionable.

- The construction of an integrated system of transport, storage, treatment, control, and disposal facilities designed to provide a given degree of control (i.e., eight overflows per year). This alternative would cost an estimated $672 million.

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[1] In general terms, primary treatment will provide 50 percent removal of pollutants, secondary treatment will provide 90 percent removal of pollutants, and tertiary treatment will provide 99 percent removal of pollutants.

THE MASTER PLAN

The Master Plan is a concept which includes a combination of pumps, pipes, storage reservoirs, treatment plants, and disposal locations which it is believed most effectively reduces the detrimental effects of waste discharges from the City of San Francisco. It includes the location and sizing of storage basins, plus the construction of dry weather and wet weather treatment facilities, transportation systems, and disposal facilities in a series of stages to achieve any desired or required level of control. The Master Plan, as shown on Figure 2, was developed by an environmental planning approach including thorough studies of key sanitary and stormwater considerations with special emphasis upon the stormwater sector as the critical aspect to the design of the combined system.

Assuming the construction of 45 retention basins, a wastewater transport system, a major wet weather treatment facility in the Southwest area of the City, an ocean outfall, and short-term high level dry weather treatment facilities at the existing Richmond-Sunset and Southeast treatment plants, the capital costs of the Master Plan concept would be approximately $672 million ($339 million for dry weather control and $333 million for wet weather control). The $333 million cost for wet weather facilities is equal to $18,000 per acre of City area which can be compared with the cost of similar programs in other cities: $12,500 in Chicago, $65,000 in Boston, and $31,000 in Washington, D.C.

On an annual basis, the estimated $672 million capital cost equates to the following, assuming a 30-year payoff at 6 percent interest:

Assumption	Annual per capita Cost
No grant funds are available	$70
87½ percent grant funds are available for total project	$10
87½ percent grant funds are available for dry weather portion only	$30

Although the capital expenditure is rather large, it is doubtful if the committment of $10 per person per year would have any effect on other capital improvement programs. However, if no grant funds were available, the City probably would be forced to delay implementation of the Master Plan. In this

Figure 2

MASTER PLAN

The complete Master Plan for wastewater management is shown above. Retention basins (upstream — light blue, shoreline — dark blue) provide storage, control flooding, and allow regulation of flow to the transportation system (green). During the major portion of the year, wastes will receive secondary treatment at the Southeast and Richmond-Sunset plants. These treated effluents will be transmitted through the tunnel and pipeline systems to Lake Merced where they will be discharged approximately 4 miles offshore. The North Point Plant will be abandoned. During storm conditions, flows exceeding the capacity of the secondary treatment plants will be transported to a 1000 million-gallon-per-day capacity treatment plant at Lake Merced. The effluent will be discharged 2 miles offshore. The system will provide secondary treatment of all waste during a major part of the year and the bypassing of untreated waste will be virtually eliminated.

event, it is unlikely that the State would force the City to complete the program with 100 percent local financing. While the State could require the City to proceed, it is not likely to as long as the potential for grant funds remains.

The estimated cost was based on the reduction of overflows to only 8 per year compared to the existing 82 overflows per year. This would accomplish 90 percent control of wet weather overflows. However, it should be pointed out that by the addition of storage capacity essentially complete control (99 percent) could be accomplished. The additional costs of greater control are presented below:

		Additional capital costs	
Number of overflows	Level of Control	million	Annual per capita (30 years @ 6%)
8 per year	90%	$0	$0
4 per year	95%	$63	$6.50
1 per year	99%	$189	$19.50
1 per 5 years	99+%	$332	$34.50

The exact level of control that is to be selected will be determined during special detailed studies for the three major watersheds.

Implementation of the first stage of the Master Plan, as shown on Figure 3, is necessary to comply with provisions of the Federal Water Pollution Control Act, which requires secondary treatment of all dry weather flows by July 1, 1977.

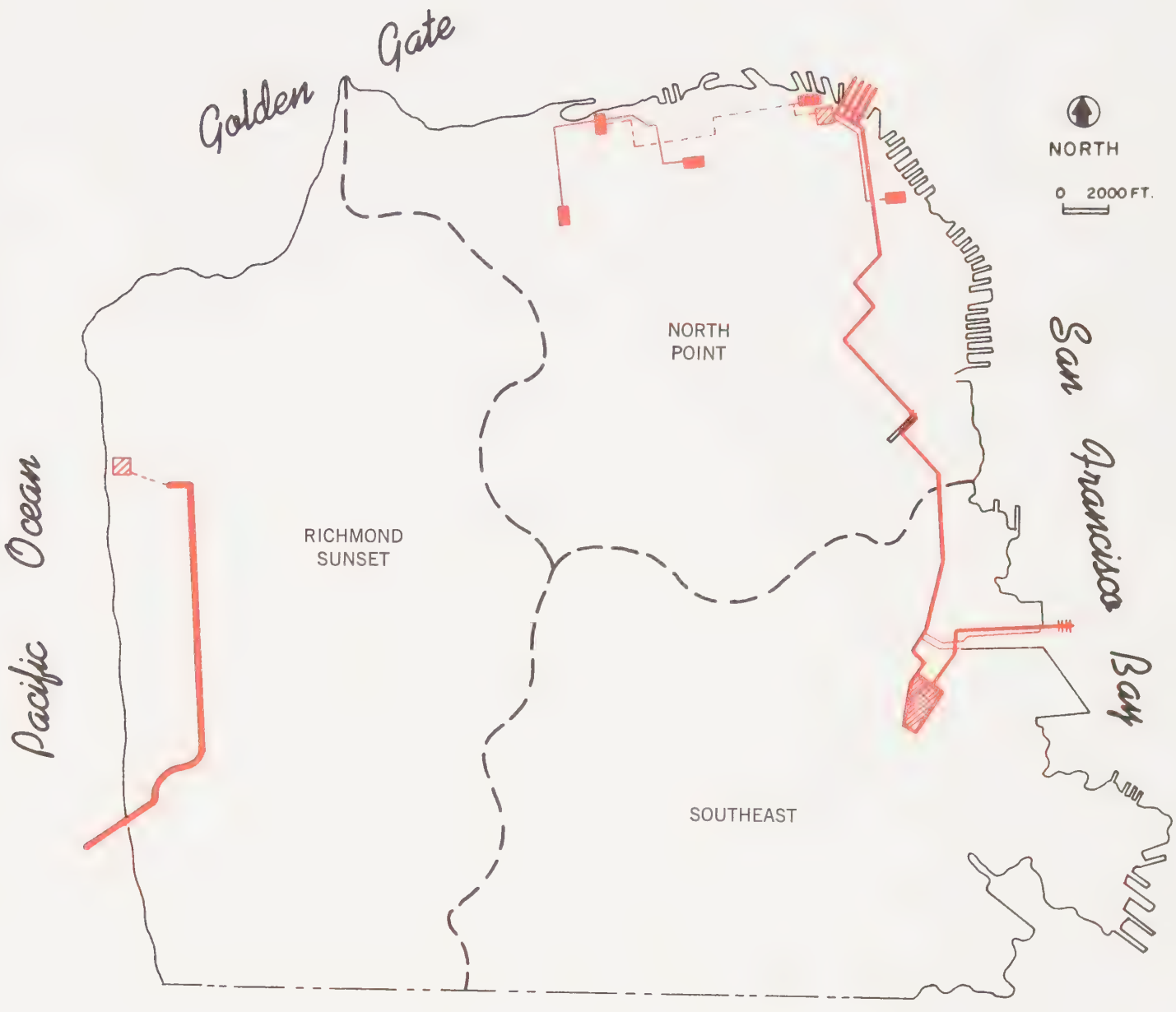
However, it is not possible for the City to comply with the July 1, 1977 date. The City does intend to proceed with due diligence and provide secondary treatment of all dry weather flows by January 1, 1980.

The Master Plan can be adjusted in a number of ways. For example, the number of upstream basins could be reduced by increasing the number of shoreline basins; the cross-town tunnel could be enlarged to provide additional storage as well as conveyance; or the wet weather treatment facility could be located on the Bay side of the City and treated wastewaters discharged to the Bay or Ocean.

It is not possible, or even desirable, to fully define the Master Plan at this time; too many changes in land use, wastewater treatment technology, and construction costs will take place in the next few years. Therefore, each phase or stage of the project should be designed to provide optimum water quality improvement as well as allowing for future changes such as a greater potential for wastewater reclamation.

Figure 3

FIRST PHASE OF MASTER PLAN



The improvement program designed to achieve early compliance with State and Federal treatment standards and to reduce overflows in the critical north shore and ocean beach areas is shown in red. Raw waste from the North Point service area will be pumped to the Southeast Treatment Plant. The Southeast Plant will provide secondary treatment for the dry weather flows from the North Point and Southeast areas. The effluent will be discharged to the Bay through an improved outfall. Wet weather waste control facilities will be constructed to control overflows in the north shore area. The North Point Plant will be converted to a wet weather facility to treat wastewaters from the area during storm periods. The Richmond-Sunset wastwater treatment plant will be substantially improved to produce an effluent quality acceptable for continued ocean disposal. Effluent from the Richmond-Sunset Plant will be transmitted to the Lake Merced area for ocean disposal.

The most promising potential use of reclaimed San Francisco wastewater appears to be landscape irrigation within Golden Gate Park and the three golf courses in the Lake Merced area. However, the total seasonal demand for these uses is only 5.0 mgd--less than 5 percent of the total average dry weather flow.

There is also a potential for irrigation use in the Central Valley; however, the economic and environmental costs of conveyance systems make the use of reclaimed water in these areas far more costly than existing water supplies. As the existing water supplies become more fully used, however, it may become more economically feasible to reclaim wastewaters for large scale irrigation projects.

The potential for reclamation can best be realized first in the construction of small, advanced waste treatment plants to provide local reclamation for park use; and second, as part of an areawide program that can be developed in the next 10 to 20 years. Therefore, the Master Plan should remain flexible to allow for these eventualities.

Environmental Evaluation

The overview environmental impact report-statement is designed to evaluate all of the reasonable alternatives and subalternatives considering not only ecological and public health factors but also functional and economic factors. The overview report was prepared to comply with the Federal guidelines for preparation of environmental impact statements and with the State and City guidelines for preparation of environmental impact reports.

A comparison of the alternative concepts considered in the development of the Master Plan on the basis of functional, economic, and environmental factors is presented in Table 1. Each of the alternative concepts is assigned an overall environmental ranking.

Criteria for evaluating functional rating factors are as follows:

Regulatory Compliance.

1. Ability to comply with State and Federal water quality requirements.

2. Conformity with regional planning.

TABLE 1

FUNCTIONAL, ECONOMIC, AND ENVIRONMENTAL RATING[1]
OF ALTERNATIVE CONCEPTS

	No Project	Many Individ. Treatment Plants	Expand Three Existing Plants	One Regional Plant Without Storage	Storage/ Treatment Master Plan	Sewer Separation
Functional						
Regulatory Compliance	Unaccept.	Marginal	Unaccept.	Good	Good	Marginal
Implement.	Unaccept.	Unaccept.	Unaccept.	Unaccept.	Accept.	Unaccept.
Reliability	Unaccept.	Unaccept.	Marginal	Marginal	Good	Marginal
Flexibility	Unaccept.	Unaccept.	Marginal	Marginal	Good	Unaccept.
Reclamation Potential	Marginal	Marginal	Accept.	Accept.	Good	Marginal
Economic						
Total Capital Cost ($million)	0	3,000	1,000[3]	2,000[3]	672	3,000
Per Capita w/grants		$540	$180	$360	$120	$540
w/o grants		$4,300	$1,430	$2,860	$960	$4,300
Environmental						
Construct. Impacts	None	Sig.	Sig.	Sig.	Sig.	Sig.
Operational Impacts	Sig.	Sig.	Sig.	Moderate	Minimal	Sig.
Secondary Impacts	Sig.	Moderate	Moderate	Minimal	Minimal	Moderate
Environmental Ranking[2]	6	5	3	2	1	4

[1]Rating Scale--Functional: Good, Acceptable, Marginal, Unacceptable
Environmental: Significant Adverse Effects, Moderate Adverse Effects, Minimal Adverse Effects

[2]Environmental Ranking--1 is most acceptable, 6 is least acceptable.

[3]Plant cost only exclusive of collection system modifications.

Implementation.

1. Acceptability of the concept and probability of support by the general public and local government.

2. Ease of construction and permit acquisition.

Reliability.

1. Ability of concept to consistently attain design performance standards.

2. Vulnerability to system failure or natural disaster and resulting impacts from such a failure are minimized.

Flexibility.

1. Ability to adapt to advanced technology and future discharge requirements.

2. Ability to adapt to future land use changes.

3. Research options are not constrained.

4. Concept provides maximum interim protection.

Reclamation Potential.

1. Concept provides no location restraints on future reclamation options.

2. Ability of concept to adapt to treatment requirements for reclamation.

As shown in Table 1, the Master Plan is the most environmentally acceptable, the most cost-effective, and the most functional concept of the six that were considered.

All alternatives considered would result in a substantial reduction in the total quantity of pollutants discharged into the Bay and Ocean. Long-term discharges to the Bay are likely to require greater pollutant removals than similar discharges to the Ocean. This reflects the greater dilution available

in the Ocean, environmental characteristics, and likely interpretations of new Federal effluent requirements. In addition, detailed biological studies, that are still in progress, have shown that the least sensitive area of the marine environment adjacent to San Francisco is in the Ocean southwesterly from the City.

One of the most important aquatic species in this area is the Dungeness crab. Extensive studies of the effects of San Francisco wastewater on the Dungeness crab life cycle have been unable to demonstrate that there would be any detectable short-term harm to this species because of the proposed waste discharge.

Until significant quantities of the City's wastewaters can be reclaimed, the least risk area of discharge is that proposed in the Master Plan. Any possible future impacts would be mitigated through design to improve levels of pollutant removal with a minimum of capital investment in the Southwest Treatment Facility.

Implementation of the Master Plan will provide the following benefits to the residents of San Francisco:

- Significant improvement of the aquatic environment, particularly in nearshore waters.
- Significant (77 to 99 percent) reduction in the average annual days in which bacteriological swimming standards are exceeded.
- Improvement in the aesthetic quality of nearshore waters and beaches.
- Elimination of all continuous Bay discharges.
- Significant (90-99 percent) reduction of all wet weather overflows.

Unfortunately, the Master Plan also has the following negative impacts:

- High cost.
- Disruption caused by the long-term construction period (up to 20 years).
- Continuance of some overflows.
- Delay in solving the City's wastewater problems.

The degree of environmental alteration that will be caused by implementation of the project is greatly dependent upon the measure of care taken during the long-term construction period. Care should be exercised in excavation activities, equipment operation, and other construction activities to minimize all environmental disturbances. A summary of the potential adverse construction impacts and possible mitigation measures is presented in Table 2.

TABLE 2

SUMMARY OF THE POTENTIAL ADVERSE IMPACTS
AND ASSOCIATED MITIGATION MEASURES
DUE TO CONSTRUCTION OF THE
SAN FRANCISCO WASTEWATER MASTER PLAN

Potential Adverse Impacts	Mitigation Measures
Land use change from open space to public use.	All facilities should be designed for multipurpose uses where practical.
Temporary disruption in traffic flow.	Close liaison should be maintained with the City's traffic engineers to assure that traffic movement is as smooth as possible.
Increase in ambient noise levels due to operation of construction equipment.	Requirements of San Francisco's noise ordinance must be met.
Disturbance of soils creating possible erosion problems and additions of dust to the atmosphere.	Construction should be scheduled to avoid rainy weather; dust can be minimized by watering dry soils and covering haul vehicles.
Temporary disruption of native flora and fauna.	Care should be exercised during construction activities to minimize disruption.
Temporary loss in aesthetic appeal in localized areas.	Replacement of destroyed vegetation should be included in post-construction planning.
Temporary disruption in utility service.	Communication with all utility companies should be maintained prior to and during construction period.
Temporary increase in turbidity in Bay and Ocean waters during outfall construction.	Requirements of the regulatory agencies must be met.

Present research indicates that operation of the Master Plan will have, at most, minimal adverse environmental impacts. All wastewater facilities have the potential for producing odors. The risk will be higher at the storage and treatment facilities than it will be in the conveyance system. However, this potential impact can be mitigated through careful design of components to completely control exhaust gases through covering and treatment. Through careful design, construction, and operation of these facilities, the potential impact and risk of future odor nuisance can be reduced to an insignificant level.

The proposed facilities could be damaged or disrupted as a result of a significant earthquake and associated movement along the San Andreas Fault. However, earthquake effects need not be critically damaging to the on-land portion of the Master Plan facilities, if proper seismic planning and design are utilized. It is certain, however, that the Ocean outfall will be subjected to right-lateral earthquake displacements (sea-side moves north) where it crosses the San Andreas Fault rift zone. There will likely be breakage (probably at the rift zone) of the outfall during rupture of the San Andreas Fault resulting in a major reconstruction program at the point of breakage following such an event. If the two-mile wet weather outfall is kept short of the fault zone, an automatic back-up discharge point would be provided while the dry weather outfall is being repaired.